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Spontaneous Systemic Tumor Embolism Caused by Tumor Invasion of Pulmonary Vein in a Patient with Advanced Lung Cancer

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We describe a 72-year-old man who presented with left hemiparesis due to acute cerebral infarction in the right fronto-temporal lobe. Three months prior to admission, he was hospitalized for right hemiparesis due to the acute cerebral infarction in the left anterior cerebral artery territory. To investigate the cause of his recurrent embolic event, a chest computed tomography scan and echocardiography were performed, which revealed advanced lung cancer invading contiguously through the pulmonary veins to the right main pulmonary artery and left atrium. Tumor embolism is a rare cause of stroke, occurring with primary or metastatic neoplasms of the lung. Echocardiography is a useful tool in patients with cerebral embolic episodes.

KEY WORDS: Tumor embolism · Stroke · Lung cancer.

Introduction

The prevalence and mortality rate of stroke still remains high and of all strokes, 87% are ischemic.[1)] Cardiogenic embolism explains about 15-30% of ischemic strokes.[2)] Neoplastic nature of an embolus is unusual and becomes even rarer except for systemic tumor emboli driven by left atrial myxomas. Primary or metastatic neoplasms of the lung are reported to be the more common source of cardiogenic embolus of the neoplastic origin.[3)] We report a rare case of ischemic stroke in a patient with advanced lung cancer that invaded directly into the left atrium (LA) by way of pulmonary veins.

Case

A 72-year-old man was transferred to our emergency department due to the left side weakness. On arrival, he also presented with dyspnea and cough productive of purulent sputum. Three months prior to the current admission, he was hospitalized in a local clinic due to right hemiparesis and was diagnosed with acute left anterior cerebral artery infarction by brain magnetic resonanace imaging (MRI). Chest computed tomography (CT) revealed the mass suspicious of lung cancer in the right lower lobe. The mass was originated from right lower lung field and invaded right pulmonary artery, vein and LA. Biopsy of the lung lesion was recommended for additional diagnostic confirmation but his family rejected the performance of further evaluation.

When he visited our hospital, he had a blood pressure of 100/60 mmHg, a pulse rate of 76/min, a temperature of 36.3°C, and a respiratory rate of 25/min. His general appearance was chronically ill-looking and he was in a drowsy status. His white blood count (12,400/μL) and high sensitive C-reactive protein (6.79 mg/dL) were elevated and chest X-ray showed multifocal pneumonic infiltration in both lung fields as well as a huge mass in the lower zone of the right lung. His brain CT showed the old cerebral infarction in the left medial-frontal area and the acute cerebral infarction in the right fronto-temporal area (Fig. 1). Transthoracic echocar-

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diographic (TTE) examination was performed to investigate the cause of his recurrent cerebroembolic episodes, revealing a very huge, mobile mass in the LA which originated from the right main pulmonary venous trunk accompanied by a small amount of pericardial effusion (Fig. 2). The mass moved in a to-and-fro fashion through the mitral valve with neither significant obstruction of the mitral inflow nor pressure gradient between the LA and left ventricle (LV). LV ejection fraction and LA size were within normal range. In order to figure out the relation of the mass to the surrounding structures, chest CT was subsequently performed, showing multi-focal consolidation in both lung fields and a huge mass of 6.0 cm by 4.5 cm size in the right lower lobe encroaching the right main pulmonary artery, right pulmonary venous trunk and LA (Fig. 3). Intracardiac mass as well as lung mass were increased and multifocal metastasis and pneumonia in both lungs were aggravated compared to previous chest CT. Metastatic lymphadenopathy at both paratracheal, lobar and interlobar station and malignant pleural effusion were also noted. Due to strong rejection of further work-up and treatment by his family members, it was inevitable to select supportive treatment. A short-time later, he passed away.

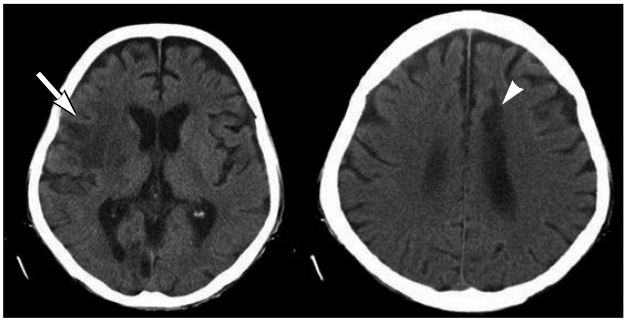

Fig. 1. Acute cerebral infarction is seen in the right fronto-temporal lobe (arrow) and the old one in left medial-frontal lobe (arrowhead).

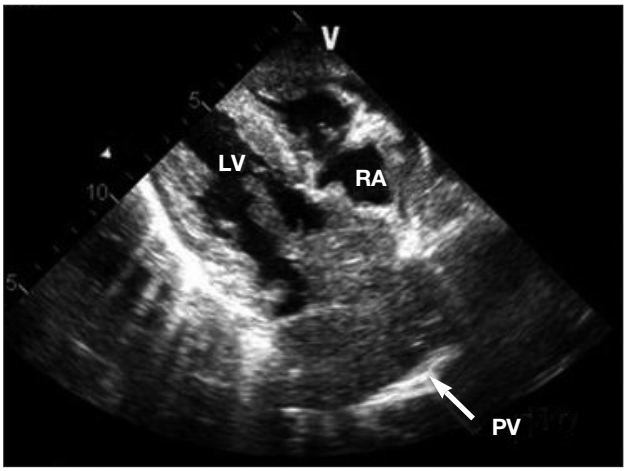

Fig. 2. Echocardiogram shows a large intracavitary globular and linear mass, occupying most of the left atrium (LA) cavity. The mass originated from the pulmonary vein (arrow), directly invaded through the pericardium and into the LA. LV: left ventricle, RA: right atrium, PV: pulmonary vein.

Fig. 3. A huge lung mass of 6.0 cm by 4.5 cm size (arrow) in the right lower lung zone that invaded into the right main pulmonary artery, right pulmonary venous trunk and left atrium is seen.

Discussion

Excluding systemic tumor emboli caused by left atrial myxomas, tumor emboli large enough to cause symptomatic cerebral ischemia are quite rare. The sites of tumor emboli reported most frequently are the aortic bifurcation or femoral vessels (50%) and the cerebral circulation (30%).[4)5)] In the most cases, an advanced primary or metastatic pulmonary tumor gains access to the arterial system through the pulmonary veins.[6)7)] Lung cancer invades the heart in two different ways: direct invasion by a primary tumor or a metastatic lymph node, and tumor invasion contiguously through the pulmonary veins. The majority of these cases of arterial tumor embolization have been reported during or shortly after pulmonary resection,[4)] rather than occurring spontaneously, as was the case with our patient. To our knowledge, there have been less than 10 cases of spontaneous systemic tumor embolization that were proved to be secondary to tumor invasion to the pulmonary vein of lung cancer, and most of the patients carried a grave prognosis.[3)6-9)]

In this case, we described a case of systemic tumor embolization originating from lung cancer invading pulmonary vein and LA, in which TTE was able to clearly identify the source of embolism. The patient did not present any symptom or sign suggestive of a pulmonary malignancy and cerebral embolic episode only represented the clinical symptoms of a lung cancer. In this context, echocardiogram becomes important as it can reveal the cardiac source of embolism in patients with cerebral ischemic attack and transesophageal echocardiography should be also advisable to detect LA appendage, patent foramen ovale, aortic atheroma and to visualize of pulmonary veins because tumor invasion of the pulmonary veins, even if rare enough, must be considered among the possible causes of systemic embolism.[10)] Based on

the guideline, echocardiography is recommended in all young patients (less than 45 years) with neurological events and in old ones (more than 45 years) without evidence of cerebrovascular disease.[10)]

In conclusion, cerebral embolic episode can be the only clinical presentation of patients with metastatic cardiac tumor and it reaffirms the importance of echocardiography as a useful diagnostic means to detect cardiac embolic sources in these patients.

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